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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/966,572	09/25/2001	Ho-Jin Kweon	47227/DBP/Y35	3776
23363	7590	03/19/2004	EXAMINER	
CHRISTIE, PARKER & HALE, LLP 350 WEST COLORADO BOULEVARD SUITE 500 PASADENA, CA 91105			WILLS, MONIQUE M	
			ART UNIT	PAPER NUMBER
			1746	

DATE MAILED: 03/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/966,572

Applicant(s)

KWEON ET AL.

Examiner

Wills M Monique

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 02 January 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-4, 6-11, 13-20 and 22-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4, 6-11, 13-20 and 22-28 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 September 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

*Response to Amendment*

The rejection of claims 1-6 under 35 U.S.C. 102(b) as being anticipated by Amatucci et al., U.S. Patent 5,705,291, is overcome. The rejection of claims 1 & 3-6 under 35 U.S.C. 102(e) as being anticipated by Howard Jr. et al., U.S. Patent 6,558,844, is overcome. The rejection of claims 7,8,11-14, & 17-21 under 35 U.S.C. 102(b) as being anticipated by Wang, U.S. Patent 5,783,328, is overcome. The rejection of claims 9,10,15,16, & 22-25 under 35 U.S.C. 103(a) as being unpatentable over Wang, U.S. Patent 5,783,328, as applied to claims 7 & 13, in view of Howard Jr. et al., U.S. Patent 6,558,844, is overcome. The rejection of claims 26-28 under 35 U.S.C. 103(a) as being unpatentable over Wang, U.S. Patent 5,783,328, in view of Amatucci et al., U.S. Patent 5,705,29, and further in view of Howard Jr. et al., U.S. Patent 6,558,844, is overcome. Claims 5,12 & 21 have been cancelled. The new rejections are as follows:

- Claims 6,11 and 17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
- Claims 1-4 & 6-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amatucci et al., U.S. Patent 5,705,291.

- Claims 1,2,6-8,11,13,14,17,19,20 & 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al., U.S. Pub. 2002/0076613.
- Claims 1,3,4,6,7,9-11,13,15-19,20, & 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang U.S. Publication 2002/0119372
- Claims 23-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang, U.S. Publication 2002/0119372, in view of Amatucci et al., U.S. Patent 5,705,291.

*Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 6,11 and 17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The metal, of the metal oxide layer, is selected from a group including elements that are not metals. More specifically, silicon, boron and arsenic are metalloids. Therefore, the claims will be interpreted as requiring a metal oxide that may contain metalloids. Appropriate correction is required.

Claims 6,11 & 17 are rejected under 35 U.S.C. 112, second paragraph, as failing to set forth the subject matter which applicant(s) regard as their invention. Claims 6, 11

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& 17 fail(s) to correspond in scope with the specification. The specification categorizes silicon, boron and arsenic as elements, not metals. This statement indicates that the invention is different from what is defined in the claim(s).

*Claim interpretation*

The claims will be interpreted as requiring a metal oxide that may contain metalloids. For example,  $\text{LiBO}_2$  is a metal oxide including boron. Based on the Examiner's interpretation of the claims, a coating element including  $\text{LiBO}_2$  meets the limitations of claims 6, 11 & 17.

*Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-4 & 6-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amatucci et al. U.S. Patent 5,705,291.

Amatucci teaches a positive electrode composition layer coated on a current collector (col. 2, lines 60-68). With respect to claims 1 & 7, the positive active material

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comprises a core lithiated compound of  $\text{LiMn}_2\text{O}_4$  (col. 4, lines 5-10) and metal oxide layer including aluminum oxide formed on said core (col. 2, lines 20-25). With respect to claims 2 & 8, the lithiated compound,  $\text{LiMn}_2\text{O}_4$ , represents formula 3, when  $x=1$  and  $z=0$ . With respect to claims 3, 4, 9 & 10, the coating mixture includes 0.4 to 1.0 % by weight of the positive active material (col. 5, lines 25-35). With respect to claims 6 & 11, the oxide may include  $\text{B}_2\text{O}_3$  (col. 5, lines 25-45) or  $\text{Al}_2\text{O}_3$  (col. 2, lines 10-25). The coating material reduces the surface area of the active material thereby, minimizing self-discharge of the battery during storage (col. 2, lines 1-5).

The reference is silent to at least two metal oxide layers formed on the core.

However, it would have been obvious to one of ordinary skill in the art at the time the instant invention was made to employ an additional metal oxide coating on the lithiated compound, because Amatucci teaches that said coating reduces the surface area of the active material thereby, minimizing self-discharge of the battery during storage.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1,2,6-8,11,13,14,17,19,20 & 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. U.S. Pub. 2002/0076613.

Lee teaches a method for surface treatment of a positive electrode material in a lithium secondary battery (abstract). With respect to claims 1 & 7, Lee teaches a positive active material comprising a core material of  $\text{LiNi}_{1-x-y}\text{Co}_x\text{M}_y\text{O}_2$  (¶ 31), coated with a lithium transition metal oxide (¶32). With respect to claims 2, 8 & 14, the core compound,  $\text{LiNi}_{1-x-y}\text{Co}_x\text{M}_y\text{O}_2$ , represents formula 7, when the stoichiometric values of the instant claims are  $z=0$  and  $x=1$ . With respect to claims 6,11 & 17, the metal oxide coating includes aluminum and cobalt (¶32). With respect to claim 13, the coating method includes coating a  $\text{LiCoO}_2$  with an organic solution including  $\text{LiMn}_2\text{O}_4$ , and heat treating the coated oxide in an oxygen atmosphere at  $800^\circ\text{C}$  for 6 hours (¶35). With respect to claims 19 & 20, the heat treatment is performed in an oxygen atmosphere at  $800^\circ\text{C}$  for 6 hours (¶35). The coating material minimizes the decrement of discharge capacity and improves thermal stability of the cell (¶9).

Lee is silent to coating the lithiated compound with two metal oxide layers (1 & 7). The reference is silent to performing multiple coating/heat-treatment steps to form additional metal oxide layers on the core (claims 13 & 22).

However, it would have been obvious to one of ordinary skill in the art at the time the instant invention was made to repeat the coating/heat-treatment steps to form additional metal oxide coatings on the lithiated compound, because Lee teaches that

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said coating minimizes the decrement of discharge capacity and improves thermal stability of the cell.

*Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1,3,4,6,7,9-11,13,15-19,20, & 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang U.S. Publication 2002/0119372.

With respect to claims 1 & 7, Zhang teaches a  $\text{LiCoO}_2$  core compound coated with  $\text{LiBO}_2$  metal oxide (¶33). With respect to claims 3,4,9,10,15 & 16, the cathode powder is treated with  $\text{LiBO}_2$  in the range of 0.01 to 2 wt% based on the amount of positive active material (¶ 18). With respect to claims 6, 11 & 17, the  $\text{LiBO}_2$  metal oxide coating includes boron (¶28). With respect to claims 13,19 & 20, the  $\text{LiCO}_2$  is coated by dissolving  $\text{LiBO}_2$  in water and heating at 250° C for 1.5 hours under air (¶33). The coating material improves capacity fade rate characteristics of non-aqueous rechargeable lithium batteries (¶18).

Zhang is silent to: coating the lithiated compound with two metal oxide layers (1 & 7); performing multiple coating/heat-treatment steps to form additional metal oxide



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layers on the core (claims 13 & 22); and the coating solution comprising two different metal oxides (claim 18).

However, it would have been obvious to one of ordinary skill in the art at the time the instant invention was made to repeat the coating/heat-treatment steps to form additional metal oxide coatings on the lithiated compound, because Zhang teaches that said coating improves capacity fade rate characteristics of non-aqueous rechargeable lithium batteries.

With respect to claim 18, it would have been obvious to one having ordinary skill in the art at the time the instant invention was made to employ a mixture of lithium transition metal oxides in the coating solution, because Zhang teaches that lithium transition metal oxides increase thermal stability. In other words, the skilled artisan would be motivated to employ more than one lithium transition metal oxide in the coating solution to further improve thermal stability.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 23-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang, U.S. Publication 2002/0119372, in view of Amatucci et al., U.S. Patent 5,705,291.

Zhang teaches coating a cathodic material with lithium borate (§110). With respect to claims 23 & 26, Zhang teaches a core comprising  $\text{LiCoO}_2$  coated with lithium-boron oxide (§133). With respect to claims 27 & 28, the lithium borate is 0.01 % to 0.15% by weight of the cathode powder (§126).

Zhang is silent to coating the core with  $\text{Al}_2\text{O}_3$  (claim 23), wherein the content of Al in the metal oxide layer ranges from 0.001 to 2 wt% (claims 24-25).

Amatucci teaches coating lithium oxide materials with  $\text{Al}_2\text{O}_3$  to reduce the surface area of the active material thereby, minimizing self-discharge of the battery during storage (col. 2, lines 2-30). With respect to claims 24-25, the coating material is present up to about 1 wt % of the cathode material (Examples 1-4).

The invention as a whole would have been obvious to one having ordinary skill in the art at the time the instant invention was made, because even though Zhang does not teach coating the lithiated compound with  $\text{Al}_2\text{O}_3$ , Amatucci teaches coating lithium oxide materials with  $\text{Al}_2\text{O}_3$  to reduce the surface area of the active material thereby, minimizing self-discharge of the battery during storage.

With respect to claims 24-25, Amatucci teaches that the coating material is up to 1 wt % of the cathode material (examples 1-4), which embraces the content of Al of the  $\text{Al}_2\text{O}_3$  layer ranging from  $2 \times 10^{-5}$  to 2 % by weight of cathode material.

With respect to claims 23 & 26, Zhang teaches that the lithium borate is 0.01 % to 0.15% by weight of the cathode powder (¶26), which embraces the content of B of the metal oxide layer ranging from  $2 \times 10^{-5}$  to 2 % by weight of cathode material.

### *Response to Arguments*

Applicant assert that Amatucci et al., U.S. Patent 5,705,291, does not anticipate the subject invention, because the reference is silent to forming two metal oxide coatings on the core. This assertion is correct, and the rejection of claims 1-6 under 35 U.S.C. 102(b) as being anticipated by Amatucci et al., U.S. Patent 5,705,291, is overcome.

Applicant assert that Howard Jr. et al., U.S. Patent 6,558,844, does not anticipate the subject invention, because the reference is silent to forming two metal oxide coatings on the core. This assertion is correct, and the rejection of claims 1 & 3-6 under 35 U.S.C. 102(e) as being anticipated by Howard Jr. et al., U.S. Patent 6,558,844, is overcome.

Applicant assert that Wang, U.S. Patent 5,783,328, does not anticipate the subject invention, because the reference is silent to metal oxide coatings on the core. This assertion is correct, because Wang teaches coating a lithiated core compound with hydroxide materials. Therefore, the rejection of claims 7,8,11-14, & 17-21 under 35 U.S.C. 102(b) as being anticipated by Wang, U.S. Patent 5,783,328, is overcome.

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Applicant asserts that the subject invention is not obvious over Wang, U.S. Patent 5,783,328, because the reference is silent to coating the core with metal oxide material. This assertion is correct, because Wang teaches coating a lithiated core compound with hydroxide materials. Therefore the following rejections are overcome: the rejection of claims 9,10,15,16, & 22-25 under 35 U.S.C. 103(a) as being unpatentable over Wang, U.S. Patent 5,783,328, as applied to claims 7 & 13, in view of Howard Jr. et al., U.S. Patent 6,558,844; and the rejection of claims 26-28 under 35 U.S.C. 103(a) as being unpatentable over Wang, U.S. Patent 5,783,328, in view of Amatucci et al., U.S. Patent 5,705,29, and further in view of Howard Jr. et al., U.S. Patent 6,558,844.

### *Conclusions*

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and

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any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

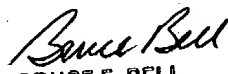
Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Monique Wills whose telephone number is (571) 272-1309. The Examiner can normally be reached on Monday-Friday from 8:30am to 5:00 pm.

If attempts to reach Examiner by telephone are unsuccessful, the Examiner's supervisor, Randy Gulakowski, may be reached at 571-272-1302. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mw

03/10/04

  
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